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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/768,747	01/23/2004	Martin Peckerar	83,028	7954

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Naval Research Laboratory  
4555 Overlook Ave., S.W.  
Code 1008.2  
Washington, DC 20375-5320

EXAMINER
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GUERRERO, MARIA F

ART UNIT	PAPER NUMBER
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2822

DATE MAILED: 09/30/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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<b>Office Action Summary</b>	<b>Application No.</b> 10/768,747	<b>Applicant(s)</b> PECKERAR ET AL.	
	<b>Examiner</b> Maria Guerrero	<b>Art Unit</b> 2822	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 14 May 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |                                                                                                                        |                                                                                         |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                            | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____                                                |

### **DETAILED ACTION**

1. This Office Action is the First Office Action on the merits.

#### **Status of Claims**

2. Claims 1-20 are pending.

#### ***Specification***

3. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

#### ***Claim Objections***

4. Claim 15 is objected to because of the following informalities: claim 15 recites "substrateand", in line 2. Appropriate correction is required.

#### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 3 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 3 recites "depositing a resist material on the substrate surface before depositing the mask material; developing the resist material and

removing and the mask material to create the opening where the active material is grown. The claim is vague and indefinite.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-10, 13-15 and 17 are rejected under 35 U.S.C. 102(b) as being anticipated by Pankove (US 3,864,592).
7. Pankove teaches a method of making a device comprising the steps of: (a) depositing a dielectric thin film mask material (silicon oxide) on a semiconductor substrate (sapphire) surface; (b) patterning the mask material to form openings therein extending to the substrate surface; (c) growing active material (gallium nitride) in the openings; (d) removing the mask material to form the device with reduced extended defect density; and (e) depositing electrical contacts on the device (Abstract, Fig. 1-6, col. 3, lines 1-50) .
8. Pankove discloses the steps of: cleaning the exposed substrate surface to make it ready for epitaxial deposition of the active material, doping the active material, depositing a resist material on the mask material, developing the resist material, and

creating the openings. Pankove shows the substrate surface including a thin film of a starting material (Fig. 1-6, col. 3, line 1-67, col. 4, lines 1-67).

9. Pankove teaches a device having reduced extended defect density comprising a substrate (sapphire), a semiconductor active material (gallium nitride) deposited on said substrate and having atomically smooth surfaces, and electrical contacts on said device (Fig. 1-6, col. 3, line 1-67, col. 4, lines 1-67).

10. Claims 1-10, 12-15 and 17 are rejected under 35 U.S.C. 102(b) as being anticipated by Davis et al. (US 6,051,849).

11. Davis et al. teaches a method of making a device comprising the steps of: (a) depositing a dielectric thin film mask material (silicon oxide) on a semiconductor substrate (sapphire, silicon carbide) surface; (b) patterning the mask material to form openings therein extending to the substrate surface; (c) growing active material (gallium nitride) in the openings; (d) removing the mask material to form the device with reduced extended defect density; and (e) depositing electrical contacts on the device (Abstract, Fig. 1-5, col. 2, lines 24-65, col. 3, lines 25-67, col. 4, lines 1-65, col. 6, lines 40-57).

12. Davis et al. discloses the steps of: cleaning the exposed substrate surface to make it ready for epitaxial deposition of the active material, doping the active material, depositing a resist material on the mask material, developing the resist material, and creating the openings. Davis et al. shows the substrate surface including a thin film of a starting material and the mask material having 1000 Angstroms (col. 3, lines 25-65, col. 4, lines 1-67).

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13. Davis et al. teaches a device having reduced extended defect density comprising a substrate (sapphire), a semiconductor active material (gallium nitride) deposited on said substrate and having atomically smooth surfaces, and electrical contacts on said device (Abstract, Fig. 1-5, col. 3, lines 25-67, col. 4, lines 1-65, col. 6, lines 40-57).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

14. Claims 11-12, 16 and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pankove (US 3,864,592).

Pankove does not specifically show the rate, thickness, bandgap, frequency, power and current as claimed. However, one of ordinary skill in the art would have

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found it prima facie obvious at the time of the invention to include these variables merely by following the teachings of the reference. In this regard, it is well settled that it is not inventive to determine (by mere routine experimentation) the optimum values of a result-effective variable. In re Peterson, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382 (Fed. Cir, 2003)(“The normal desire of scientist or artisans to determine where in a disclosed set of percentage ranges is the optimum combination of percentages.”); In re Boesch, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980) (“Discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art.”); In re Aller 220 F. 2d 454, 456, 105 USPQ 233, 235, (CCPA 1955)(“Where the general conditions of a claim are discloses in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.”)

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to include the rate, thickness, bandgap, frequency, power and current in Pankove reference by routine experimentation because there is not evidence of unexpected results.

15. Claims 11, 16 and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Davis et al. (US 6,051,849).

Davis et al. does not specifically show the rate, bandgap, frequency, power and current as claimed. However, one of ordinary skill in the art would have found it prima facie obvious at the time of the invention to include these variables merely by following the teachings of the reference. In this regard, it is well settled that it is not inventive to determine (by mere routine experimentation) the optimum values of a result-effective

variable. In re Peterson, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382 (Fed. Cir, 2003)(“The normal desire of scientist or artisans to determine where in a disclosed set of percentage ranges is the optimum combination of percentages.”); In re Boesch, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980) (“Discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art.”); In re Aller 220 F. 2d 454, 456, 105 USPQ 233, 235, (CCPA 1955)(“Where the general conditions of a claim are discloses in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.”)

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to include the rate, thickness, bandgap, frequency, power and current in Davis et al. reference by routine experimentation because there is not evidence of unexpected results.

### ***Conclusion***

16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Bhat et al. (US 5,796,902), Kong et al. (US 6,812,053), Linthicum et al. (US 6,177,688), Kurogi et al. (US 4,637,127), Beetz, Jr. (US 5,006,914), Craven et al. (US 6,900,070) and Pankove (US 3,683,240) show several embodiments related to applicant's disclosure.

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maria Guerrero whose telephone number is 571-272-1837.



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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 571-272-1852. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

September 27, 2005

*Maria Guerrero*  
**MARIA F. GUERRERO**  
**PRIMARY EXAMINER**